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ABSTRACTS FROM ASTRONOMICAL PUBLICATIONS.

In accordance with a recent arrangement the members of the scientific staff of the Lick Observatory hold meetings once per week, as an observatory duty, to report upon and discuss the more important articles appearing in the journals of astronomy, the important new books on astronomical subjects, or subjects of current and special interest in the observatory's work. It has been suggested that abstracts of the reports would be of interest to the readers of these Publications, and the Publication Committee has acted favorably upon the suggestion.

It is intended to preserve the qualities of abstracts as far as possible, and to restrict published criticisms, favorable or unfavorable, to a minimum.

PHOTOGRAPHIC DETERMINATIONS OF STELLAR PARALLAX MADE WITH THE YERKES REFRACTOR.

This valuable paper by Dr. SCHLESINGER has appeared in seven sections in the *Astrophysical Journal,* December, 1910, to July, 1911. A full description is given of the methods used in the program, and parallaxes have been derived for twenty-eight stars. This is the first application of an instrument of such great focal length to photographic determinations of parallax, and the character of the preliminary results indicates clearly, both by their agreement with the work of other investigators and by the small probable error, that a distinct advance has been made in this field; in fact, the reduction in the size of the probable errors over the average value secured in other photographic parallax determinations is sufficient to place Dr. SCHLESINGER'S work in a class by itself.

Every care was taken to obviate the various sources of systematic error, hour-angle error, etc., but doubtless the greater part of the increased accuracy obtained was due to the method employed for eliminating the so-called "guiding error," which depends upon the difference in magnitude of the parallax star and the reference stars. This device consists of a small disk rotated by an electric motor; the disk is provided with an adjustable sector aperture, so that any desired diminution of the light of the parallax star up to about seven magnitudes can be obtained, and the size of the sector can be set with sufficient accuracy so as to reduce the parallax star to the mean magnitude of the comparison stars employed. A somewhat similar device was employed by BURCKHALTER to obtain evenly exposed negatives of the solar corona, but has not, to my knowledge, been hitherto employed in parallax work.

The average probable error of the determination of a single star from thirteen plates is only 0″.013, about half of the average of all previous photographic work and less than one-third the average value for all previous micrometer, meridian circle, and heliometer determinations.

Among Dr. SCHLESINGER'S conclusions are: "With a telescope of this size and character, the number of stellar parallaxes that can be determined per annum with an average probable error of ± 0″.013 will (in the long run) be about equal to the number of clear nights available for this work. . . . For practical purposes the measurement of the plates in duplicate adds only 10 per cent to their weights. . . . Measurements upon images whose diameters have been reduced by the use of the disk are practically as accurate as those made upon correspondingly faint stars."

Our conception of the size of the universe has been steadily expanding, and the most recent results of CAMPBELL and BOSS make the average distances of the brighter stars about twice as great as was held a few years ago. All parallax programs to date have, in the main, been devoted to bright stars or to stars of great proper motion most liable, *a priori,* to be near neighbors, and the three hundred and fifty odd determinations of the distances of individual stars, valuable as they are in giving us an idea of the distance of the inner edge of the stellar sphere, can scarcely be considered as in any way representative of the stars as a whole. It is with somewhat of a feeling of helplessness that the parallax worker compares even the small probable error of these results of Dr. SCHLESINGER, by far the most accurate to date, with the average parallax of all stars to the seventh magnitude, which is almost certainly not greater than 0″.008. For an accurate idea of the size of the stellar universe and of the distances of the average, not the exceptional star, a combination of radial velocity results with proper motion values will doubtless obtain greater results in twenty years than the best existing direct methods in a century. H. D. CURTIS.

PRECISE MEASURING WITH INVAR WIRES.[1]

Invar is an alloy of nickel and steel. As the percentage of nickel is increased above twenty-five per cent the coefficient of thermal expansion diminishes until it reaches a minimum at thirty-six per cent nickel of less than one one-hundredth that of steel. On account of its small expansion it is specially adapted for making measuring wires.

Invar intended for geodetic purposes is manufactured in France. When good specimens of the alloy are obtained which show a very small expansion, they are drawn into wires of 1.05^{mm} diameter. After manufacture the wires are subject to a gradual lengthening for a period extending over several years. This process is much accelerated by subjecting the wires to a treatment known as *étuvage,* which renders them ready for use in a few months. The wires are rolled on a cylindrical boiler of 50^{cm} diameter, the boiler filled with water and kept at the boiling-point for several days. The temperature is then lowered gradually so as to reach 40° C. or even 25° C. in three months. By this process the wires undergo changes in length which otherwise would have taken several years. After *étuvage* the wires are kept several months before their absolute length is determined.

Before leaving the shop the wires are wound and unwound a great many times from a cylinder 50^{cm} in diameter until permanency of length is assured. In the actual use of the wires many corrections have to be taken into account, but the reduction in the expansion of the measure due to heat makes the corrections small. The length of Kootenay base, a length of 8.5^{km}, was measured with a probable error of 1.8^{mm}. On the same scale of precision the circumference of the earth would be determined with a probable error of 8.5 meters.

R. YOUNG.

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[1] P. A. CARSON, in the *Journal of the Royal Astronomical Society of Canada.*